

CLAIMS

What is claimed is:

1. A plasma etching apparatus comprising:
an upper electrode;
a lower electrode corresponding to the upper electrode, to place a substrate on; and
a high frequency power generator to generate plasma by applying high frequency power to the upper electrode or the lower electrode;
wherein a distance between the upper electrode and the lower electrode varies discontinuously on a portion of opposite surfaces of the electrodes by varying the shape of the upper electrode.
2. The plasma etching apparatus according to claim 1, wherein the distance between the upper electrode and the lower electrode varies discontinuously on a majority of the opposite surfaces of the electrodes.
3. The plasma etching apparatus according to claim 1, wherein the distance between the upper electrode and the lower electrode varies discontinuously on an entirety of the opposite surfaces of the electrodes.
4. The plasma etching apparatus according to claim 1, wherein the upper electrode is formed with at least one depression having sloped, stair-shaped sides.
5. The plasma etching apparatus according to claim 1, wherein the upper electrode is formed with a plurality of protrusions and depressions.
6. The plasma etching apparatus according to claim 5, wherein protrusions and depressions are symmetric about a point in the center of the upper electrode.
7. The plasma etching apparatus according to claim 5, wherein the protrusions and depressions are small enough so as to not affect distribution of gas used in an etching process.

8. The plasma etching apparatus according to claim 5, wherein the upper electrode, having the protrusions and the depressions, and corresponding to the lower electrode, is preferably parallel to the lower electrode.

9. The plasma etching apparatus according to claim 1, further comprising a gas supplier to supply gas reacting to the plasma.

10. The plasma etching apparatus according to claim 9, further comprising a vacuum pump to discharge the gas.

11. The plasma etching apparatus according to claim 10, further comprising a vacuum chamber, in which the vacuum pump causes a vacuum state by discharging the gas.

12. The plasma etching apparatus according to claim 11, wherein the upper electrode, the lower electrode, and the substrate are provided inside the vacuum chamber.

13. The plasma etching apparatus according to claim 1, further comprising a cooling pipe provided in the lower electrode, to control a temperature of the lower electrode.

14. The plasma etching apparatus according to claim 1, wherein the upper electrode or the lower electrode that is not connected to the high frequency generator is grounded.

15. The plasma etching apparatus according to claim 1, wherein the grounded upper or lower electrode comprises a metal plate and a coil.

16. A plasma etching apparatus comprising:
an upper electrode;
a lower electrode corresponding to the upper electrode, to place a substrate on; and
a high frequency generator to generate plasma by applying high frequency power to the upper electrode or the lower electrode;

wherein an etching rate is adjusted to be uniform for all parts of an etched substrate by varying a distance between the upper and the lower electrode to compensate the density of the plasma with an RF electromagnetic field applied to the upper electrode.

17. A plasma etching apparatus comprising:

an upper electrode; and

a lower electrode;

wherein an RF electromagnetic field applied to the apparatus is controlled to improve an etching uniformity by making the distance between the upper electrode and the lower electrode discontinuous between opposite surfaces.